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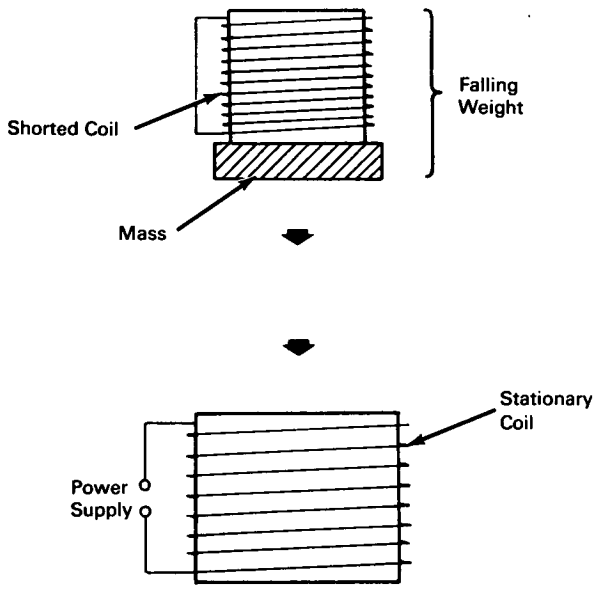
Brief 66-10073

# NASA TECH BRIEF



## Calculations Enable Optimum Design of Magnetic Brake




**The problem:**

To design optimum magnetic coil configurations for a magnetic brake that will controllably decelerate a freely falling load (in drop-tower tests) to a soft stop. The load, rigidly attached to a short-circuited magnetic coil, falls freely from a height of approximately 150 meters and approaches a speed of approximately 50 meters per second with respect to a stationary magnetically coupled coil (at the bottom of the tower) which provides the braking action.

**The solution:**

Mathematical analysis and computations for three different unconventionally wound coil configurations to determine the parameters required to obtain the desired deceleration with a minimum of electrical energy supplied to the stationary coil.

**How it's done:**

The mutual inductance between the coils as a function of the distance between them is calculated by expanding the density functions (for the different coil configurations) in a complex Fourier integral and applying the expansion to a Bessel integral representation of the vector potential. The circuit equations as well as the equation of motion of the falling load in the magnetic and gravitational fields are then solved on a computer to determine the minimum size and energy requirements of the coil systems.

(continued overleaf)

**Notes:**

1. By locating the payload (and secondary coil) within the primary coil initially, the system will function as an accelerator.
2. Inquiries and requests for further information concerning the design calculations may be directed to:

   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio, 44135
   Reference: B66-10073

**Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C., 20546.

Source: H.G. Kosmahl
(Lewis-251)